JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION

Solicitation No.: TBD
Project Name: Static Frequency Converter Controller Replacement, Eastern Colorado Area Office, Mount Elbert Pumped-Storage Plant, Lake County, Colorado

---

In accordance with FAR 6.302, the proposed contractual action is pursuant to the statutory authority of 41 U.S.C. 253(c)(1)

1. **Agency and Contracting Activity.**
Bureau of Reclamation, Great Plains Region

2. **Nature/Description of Action.**
Replacement of the Static Frequency Converter Controller at the Mount Elbert Pumped-Storage Plant (MTE). The ABB, Inc. (ABB) manufactured Static Frequency Converter (SFC) was installed by ABB in 1992. The controller portion of the SFC is now near the end of its life and the current model is no longer supported by ABB. The SFC controller replacement is a critical component of Reclamation's *Mt. Elbert Pumped-Storage Plant* and must be procured soon. The acquisition strategy includes a negotiated, firm fixed price contract, funded with power customer funds (these are non-appropriated funds), obligated in Fiscal Year 2014, and the work to be completed in Fiscal Year 2015.

3. **Description of Supplies/Services.**
This requirement is for the Static Frequency Converter Controller (controller). The controller has the following rating:

a.	Line/Motor Terminal Voltage =	11.5kV
b.	Rated Power =	~10MW
c.	SFC Input Voltage =	4395 V
d.	DC Voltage =	4926 V
e.	DC Current =	2105A
f.	SFC Output Voltage =	0-4395V

The generators at the MTE utilize a device called an SFC to soft-start 2-105MW pump/generators. ABB is the original manufacturer of the SFC and SFC Controller. ABB initially performed the design, construction, documentation, installation, and commissioning of the SFC in 1992 and has recently performed comparable upgrades at other power generation facilities. The SFC is a very large device consisting of high-voltage, high-power vacuum circuit

breakers, two power transformers, and power electronics (Figures 1 and 2 on Attachment 0001) along with the associated controls for this equipment. The SFC starts a motor by "slowly" increasing the speed of the motor by stepping up the frequency of the electrical power supplied to the motor through the starting sequence. This is done by "firing" twelve high-voltage and high-power solid-state thyristors or Silicon-Controlled Rectifiers (SCRs) (Figure 3 on Attachment 0001). The precise sequence, timing, and duration of each SCR firing is dictated by various industrial electronic controller cards along with a programmable main controller that coordinates the various functions of the cards. For simplicity, the main controller and associated controller cards will be referred to collectively as the "controller."

Eastern Colorado Area Office's current plan is to replace only the controller via a contract and reuse the remaining components. This acquisition approach offers significant cost savings over replacing the entire SFC.

The contractor will replace the presently installed controller (Figure 4 of Attachment 0001) with a compatible programmable controller capable of operating the SFC used to start both 170,000HP pumps at MTE. The contractor will be responsible for installing, programming, commissioning, documenting, training, and supporting the controller.

4. Statutory Authority Permitting Other than Full and Open Competition.

	Authority	FAR Coverage	Application
☒	41 U.S.C. 253(c)(1)	FAR 6.302-1	Only one responsible source and no other supplies or services will satisfy agency requirements
☐	41 U.S.C. 253(c)(2)	FAR 6.302-2	Unusual and compelling urgency
☐	41 U.S.C. 253(c)(3)	FAR 6.302-3	Industrial mobilization; engineering, developmental or research capability; or expert services
☐	41 U.S.C. 253(c)(4)	FAR 6.302-4	International Agreement
☐	41 U.S.C. 253(c)(5)	FAR 6.302-5	Authorized or required by statute
☐	41 U.S.C. 253(c)(6)	FAR 6.302-6	National Security
☐	41 U.S.C. 253(c)(7)	FAR 6.302-7	Public Interest

5. Demonstration of Contractor's Unique Qualifications.

Experience:

ABB is the only manufacturer worldwide with the demonstrated experience to upgrade the controller. ABB has been manufacturing the controller for 30 years. The MTE SFC unit was installed in 1992 and has been in operation over 21 years. During these 21 years, ABB has been the only company available to provide operation and maintenance training, repair services, and provide replacement parts for the controller. This evidence supports ABB as the only company available with the requisite experience mandatory to upgrade the controller. As most of the major components of the MTE SFC have several more years of service life, it is highly probable that the replacement of the SFC controller will extend the life of the SFC for at least the next 20 years.

The SFC is a very specialized piece of power equipment that only the manufacturer, ABB, can support. The risks of integrating a non-ABB controller and software are high and not in the best interest of the Government, as discussed in paragraph 9.

Using ABB will minimize the high risks involved in implementing this project since ABB is the original equipment manufacturer of the SFC with in-depth knowledge of the remaining equipment within the system.

ABB owns proprietary SFC equipment information including the control algorithm implemented and proven through extensive use at MTE. The level of knowledge, experience, and proprietary information possessed by ABB would not be available to other companies; thus, these companies would be severely restricted in their ability to satisfactorily perform the work required by the contract within the estimated costs and timelines.

ABB will replace the near end of life controller that will contain updated, proprietary algorithm programming already designed for MTE.

Proprietary Information:
ABB has over 30 years of experience in producing the MEGADRIVE-LCI converter. Much of the existing control and power equipment within the MEGADRIVE-LCI is manufactured by ABB. Many of the design details of this equipment are proprietary to ABB. The controller is also programmed in FUnctional Programming LAnguage (FUPLA). This is a graphical programing language that is not readily used or available in the industry. Only two companies, both from Switzerland (ABB and SBC), give the impression of using this language in programming their controllers as well as offering training courses. However, only ABB personnel are familiar with the program used in their controllers.

6. Description of efforts made to maximize competition.
A Request for Information (RFI) was posted to FedBizOpps on 11/30/2012 (copy attached). The RFI requested a statement of capability from interested contractors describing their capability to provide the equipment and services described and meet the experience requirements. Two responses were received: ABB and Koontz Electric Company. However, Koontz Electric Company did not document their ABB design and ABB manufacturing experience, only installation and maintenance of SFCs of similar voltage and power rates.

Additionally, Reclamation technical personnel contacted the owners of other reversible pumped-storage hydroelectric units to determine 1) if they utilize a static frequency converter to start their units, 2) if so, have they or do they plan to upgrade their SFC, and 3) if so, could they provide contact information for sources they considered. Reclamation received one response, from Rocky Mountain Pumped Storage near Rome, Georgia. They were in the process of upgrading their SFC controller and had opted to go sole source to ABB. No other potential sources were identified through this inquiry.

A Notice of Intent will be posted to FedBizOpps and FedConnect in order to notify contractors of Reclamation's intent to award to ABB. Any response received in response to the Notice of Intent will be attached to this justification. A redacted copy of this justification will be posted to FedBizOpps and FedConnect within 14 days after award.

Reclamation spent over 1 year considering what could be done to increase the level of competition. The results indicated that a sole source with ABB is in the best interest of the Government, considering price (replacing only the controller as opposed to replacing the entire (SFC) and the proprietary control algorithm owned by ABB.

7. **Determination of Fair and Reasonable Cost.**
The estimated cost of the SFC controller replacement is [redacted] This cost is based Reclamation's Government Estimate (see attached estimate).

Additionally, the Contracting Officer will determine fair and reasonable costs based on the Government's estimated costs and a review/negotiation of contractor costs.

8. **Description of Market Research Conducted.**
In addition to the RFI posting, the customer, James Bough, Reclamation Electrical Engineer contacted four major manufacturers in the hydrogenation business during November and December of 2013; including ABB. Reclamation requested information regarding costs and if the companies had recently completed similar work. Two of the responses (Mitsubishi and Toshiba) stated they would not be able to complete this type of work. Siemens stated that they could provide pricing for the replacement of the entire SFC. ABB gave stated they were able to complete the requirement.

9. **Any Other Supporting Facts.**
Duplication of Effort:
If awarded to a contractor other than ABB, there would be a substantial duplication of effort resulting in additional costs to Reclamation. This cost of duplication is based on the following:

a.) Other contractors would need to custom design a replacement controller for the MEGADRIVE-LCI SFC and Reclamation would need to cover the full cost of this development. In contrast, ABB has already performed this design work and this cost is spread among its various customers. An estimated $1M of customer revenue is generated each month at MTE. If an inexperienced contractor experiences any issues, the extended outage could be costly.

b.) Other contractors will have to perform extensive in-house quality control and testing on the developed controller. It will take weeks, if not months, of meticulous step-by-step testing to verify an unproven hardware/software solution. In contrast, ABB's has already performed this testing on the controller for previous upgrades and this cost is spread among its various

customers. A cost estimate for this duplication of effort task is at least $75,000 for the development of a new controller.

c.) Other contractors will not be able to fully simulate MTE's motor-generators and the SFC power components in their shop; therefore, extensive field testing will also be required. This will necessitate added contractor cost, plus there is significant risk to Reclamation owned equipment and a lengthy period during which MTE's availability will be adversely impacted. Assuming that it takes a non-ABB contractor at least 6 weeks to commission the unit, the associated cost estimate is at least $75,000 for contractor labor.

d.) MTE only has approximately 200 pages of the manufacturer supplied SFC hardware schematics. In order for a non-ABB contractor to reverse engineer the controller, they would need to re-draw the schematics and develop/test any modifications in order for the non-ABB controller to be compatible with the existing ABB SFC before they could begin to proceed with actual manufacturing and installation of the controller. An estimate for this duplication of task is $50,000.

Risks:

a. Improper implementation. Improper implementation of non-ABB controller hardware/software would more than likely lead to the following consequences:

i. Improper operation of the controller could damage or destroy the entire SFC system. The estimated full replacement cost of the SFC is **$2.3 million**. This is high risk with moderate impact.

ii. Improper operation of a non-ABB SFC during the line synchronization phase of the unit start-up could damage or destroy the motor-generator winding and stator core. The estimated replacement cost for a stator of this size is currently estimated at $10 million. This is a moderate risk with significant impact.

b. Failure to deliver. ABB is the original equipment manufacturer and is the only manufacturer worldwide that has upgraded the controller of a MEGADRIVE-LCI. Given the extremely complex hardware and software logic that is required to control the SFC, it is highly probable that non-ABB contractors would be unsuccessful in delivering a working system within the cost and schedule allotted for this work. In addition to the cost and time delay of any delay and/or failure, it also would lead to a very lengthy downtime at MTE for the procurement and delivery of a new SFC.

c. Warranty. The replacement controller must interact and control multiple components within the SFC which have been in service for over 20 years. Should an existing SFC component fail during testing or after a non-ABB controller replacement, it would be difficult, if not impossible, to determine if the cause of failure was due to contractor error or the component's age. This risk extends beyond the SFC to other valuable Reclamation assets including, but not limited to, the motor-generators and SFC power transformers. The only way to transfer all responsibility for delivering a properly functioning SFC

would be to specify total replacement of the SFC. This cost is estimated to be twice the cost of installing a new controller.

d. Extended commissioning downtime. When the SFC is not available, the motors cannot be started and generation capability is unavailable. ABB can minimize this downtime to approximately 2 weeks. Their demonstrated experience with installing a new controller for the MEGADRIVE-LCI will minimize downtime. Non-ABB contractors in the power business do not have this experience with the MEGADRIVE-LCI, which could extend an outage at MTE for several months while problems are resolved. At $1 million per month of customer money, this additional cost could be $3 million.

In summary, risks surrounding this project have very large, potentially negative, economic consequences and proper risk management must be considered as an integral part of establishing the procurement strategy. It is standard industry practice for major manufacturers to provide parts, maintenance, and support for the products that they have manufactured. Reverse engineering is also a standard practice; however, based on the risks and significant cost, this is not the best plan of action for the SFC controller replacement.

10. Listing of Interested Sources.

ABB Inc. (DUNS 252428024)
Koontz Electric Company (DUNS 035585207)

11. Actions Taken to Remove Barriers to Competition.

The desired result of replacing the SFC controller is to extend the life of the SFC. At the point where the SFC needs to be replaced in its entirety, a full and open competition procurement will be the best course of action.

REQUESTING OFFICE REPRESENTATIVE CERTIFICATION: ALL SUPPORTING DATA PROVIDED AND THE CONTENTS OF THIS JUSTIFICATION ARE COMPLETE AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

(All Justifications > SAT Level)

Signature

2/12/2014
Date

CONTRACTING OFFICER (CO) CERTIFICATION:

(Non-competitive actions ≤ $25K) (DIAPR 2008-10)

Amanda Jamilee Contract Specialist

Signature

2.12.2014
Date

CHIEF of the CONTRACTING OFFICE CERTIFICATION (CCO):

(New Awards ≥ $25K) (DIAPR 2008-10)

Chandler P. Worley, Jr.

Signature

2/12/14
Date

ONE LEVEL ABOVE- If the CO and CCO are the same; the justification must be approved by one level above. **(DIAR 1402.101)**

Signature/Title

Date

BUREAU COMPETITION ADVOCATE: (≥ $650K) (DIAPR 2008-10, RAC 12-06)

Signature

2/17/14

Date